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EXAMINER	
LI, SHI K	

ART UNIT	PAPER NUMBER
2633	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/626,055	HOANG ET AL.	
	Examiner	Art Unit	
	Shi K. Li	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-75* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-75* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 43-46 are rejected under 35 U.S.C. 102(a) as being anticipated by Jukan et al. (A. Jukan et al., "Constraint-based Path Selection Methods for On-demand Provisioning in WDM Networks", IEEE INFOCOM 2002).

Regarding claim 43, Jukan et al. teaches in p. 828 left col., first paragraph to collect local network state information and in second paragraph the concept of service-specific wavelength set. Jukan et al. then teaches in p. 831, right col., 4th paragraph a method of distributed discovery of wavelength path (DWP). Step 1 of the method teaches receiving connection request with a service-specific vector. Step 3 of the method teaches to select a path according to chosen criteria. Step 4 of the method teaches to establish the path.

Regarding claims 44-45, Jukan et al. teaches WDM network.

Regarding claim 46, Jukan et al. teaches on-demand provisioning (see p. 831, right col., second paragraph), i.e., real time.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. (N. Golmie et al., "A Differentiated Optical Services Model for WDM Networks", IEEE Communications Magazine, February 2000) in view of Acharya et al. (U.S. Patent Application Pub. 2004/0228323 A1)

Regarding claims 1 and 14, Golmie et al. teaches in FIG. 3 and Table 1 to divide a WDM network into separate service levels. The difference between Golmie et al. and the claimed invention is that Golmie et al. does not teach to determine service level topologies. However, it is obvious that in order to setup lightpaths for various service levels in the WDM network, it is necessary to determine network topologies. For example, Acharya et al. teaches in paragraph [0029] to use routing protocols such as OSPF-TE to determine network topologies. One of ordinary skill in the art would have been motivated to combine the teaching of Acharya et al. with the WDM network of Golmie et al. because up-to-date network topologies for each service level is necessary for setup lightpaths. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine service level topologies, as taught by Acharya et al., in the WDM network of Golmie et al. because up-to-date network topologies for each service level is necessary for setup lightpaths.

Regarding claim 2, Golmie et al. teaches in Table 1 BER.

Regarding claims 3-4, it is understood that OSPF provides connectivity for each node and network topology is the combination of connectivity for all nodes in the network.

5. Claims 5-6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. and Acharya et al. as applied to claims 1-4 and 14 above, and further in view of Kodialam et al. (U.S. Patent Application Pub. 2002/0018264 A1).

Golmie et al. and Acharya et al. have been discussed above in regard to claims 1-4 and 14. The difference between Golmie et al. and Acharya et al. and the claimed invention is that Golmie et al. and Acharya et al. do not teach conversion criteria or conversion free connectivity constraint. Kodialam et al. teaches in paragraphs [0045] and [0046] that there are OXC with wavelength conversion capability and there are OXC without wavelength conversion capability. In network consisting of OXC with wavelength conversion capability, conversion criteria must be taken into consideration. In network consisting of OXC without wavelength conversion, the conversion free constraint must be met. One of ordinary skill in the art would have been motivated to combine the teaching of Kodialam et al. with the modified WDM network of Golmie et al. and Acharya et al. because some OXC have wavelength conversion capability to provide flexibility for routing and some OXC do not have wavelength conversion capability to keep the cost of OXC low. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to consider the wavelength conversion criteria or include conversion free constraint according to the capability of network elements, as taught by Kodialam et al., in the modified WDM network of Golmie et al. and Acharya et al.

6. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. (N. Golmie et al., "A Differentiated Optical Services Model for WDM Networks", IEEE Communications Magazine, February 2000) in view of Kodialam et al. (U.S. Patent Application Pub. 2002/0018264 A1).

Golmie et al. teaches in FIG. 3 and Table 1 to divide a WDM network into separate service levels according to QoS criteria. The difference between Golmie et al. and the claimed invention is that Golmie et al. does not teach a conversion criteria. Kodialam et al. teaches in paragraphs [0045] and [0046] that there are OXC with wavelength conversion capability and there are OXC without wavelength conversion capability. In network consisting of OXC with wavelength conversion capability, conversion criteria must be taken into consideration to avoid blocking. One of ordinary skill in the art would have been motivated to combine the teaching of Kodialam et al. with the WDM network of Golmie et al. because wavelength conversion allows a light path to take different wavelengths along the path and avoid blocking while wavelength conversion is expensive and such resource is limited and must be shared among lightpaths. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to take wavelength conversion into consideration, as taught by Kodialam et al., in the WDM network of Golmie et al. because wavelength conversion allows a light path to take different wavelengths along the path and avoid blocking while wavelength conversion is expensive and such resource is limited and must be shared among lightpaths.

Regarding claim 8, Golmie et al. teaches in Table 1 BER.

Regarding claim 9, Kodialam et al. teaches in paragraph [0024] to use link-state discovery method for tracking status of wavelengths.

7. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. and Kodialam et al. as applied to claims 7-9 above, and further in view of Okajima et al. (U.S. Patent Application Pub. 2002/0120766 A1).

Golmie et al. and Kodialam et al. have been discussed above in regard to claims 7-9. The difference between Golmie et al. and Kodialam et al. and the claimed invention is that Golmie et al. and Kodialam et al. do not teach comparing parameters of links with service level parameters. Okajima et al. further teaches in FIG. 5 to monitor variable link metrics to determine whether link metrics have been changed and update link metrics accordingly. One of ordinary skill in the art would have been motivated to combine the teaching of Okajima et al. with the modified WDM network of Golmie et al. and Kodialam et al. because a link must meet service level criteria for providing the associated QoS. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to compare link parameters with classification criteria, as taught by Okajima et al., in the modified WDM network of Golmie et al. and Kodialam et al. because a link must meet service level criteria for providing the associated QoS.

8. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. and Kodialam et al. as applied to claims 7-9 above, and further in view of Ashwood Smith (U.S. Patent 6,738,354 B1).

Golmie et al. and Kodialam et al. have been discussed above in regard to claims 7-9. The difference between Golmie et al. and Kodialam et al. and the claimed invention is that Golmie et al. and Kodialam et al. do not teach wavelength availability table. Ashwood Smith teaches in FIG. 3 to use wavelength availability tables 28a, 28b and 30 during lightpath setup. One of ordinary skill in the art would have been motivated to combine the teaching of Ashwood Smith with the modified WDM network of Golmie et al. and Kodialam et al. because a wavelength availability table keeps track of the availability of wavelengths and avoid assigning same wavelength to different lightpaths. Thus it would have been obvious to one of ordinary skill in

the art at the time the invention was made to include wavelength availability tables for keeping track of whether a wavelength is allocated or available, as taught by Ashwood Smith, in the modified WDM network of Golmie et al. and Kodialam et al. because a wavelength availability table keeps track of the availability of wavelengths and avoid assigning same wavelength to different lightpaths.

9. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. and Kodialam et al. as applied to claims 7-9 above, and further in view of Matsuura et al. (U.S. Patent Application Pub. 2003/0198227 A1).

Golmie et al. and Kodialam et al. have been discussed above in regard to claims 7-9. The difference between Golmie et al. and Kodialam et al. and the claimed invention is that Golmie et al. and Kodialam et al. do not teach to use number of wavelength conversion as criteria. Matsuura et al. teaches in paragraphs [0014] and [0017] that wavelength conversion devices are expensive and the number of wavelength conversion is kept to a minimum in setting up a lightpath. One of ordinary skill in the art would have been motivated to combine the teaching of Matsuura et al. with the modified WDM network of Golmie et al. and Kodialam et al. to limit the number of wavelength conversion used because wavelength conversion devices are expensive and a OXC can have only limited number of wavelength conversion devices to be shared for all lightpaths. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use number of wavelength conversions as a criteria for service level, as taught by Matsuura et al., in the modified WDM network of Golmie et al. and Kodialam et al. to limit the number of wavelength conversion used because wavelength conversion devices are

expensive and a OXC can have only limited number of wavelength conversion devices to be shared for all lightpaths.

10. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. and Acharya et al. as applied to claims 1-4 and 14 above, and further in view of Solheim et al. (U.S. Patent Application Pub. 2003/0016414 A1).

Golmie et al. and Acharya et al. have been discussed above in regard to claims 1-4 and 14. The difference between Golmie et al. and Acharya et al. and the claimed invention is that Golmie et al. and Acharya et al. do not teach a centralized network server. Solheim et al. teaches in FIG. 2A, FIG. 3 and paragraph [0072] centralized network and element management system (NEMS) and centralized database. One of ordinary skill in the art would have been motivated to combine the teaching of Solheim et al. with the modified WDM network of Golmie et al. and Acharya et al. because a centralized database provides network management personnel a whole picture of the network and facilitates network management. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a centralized database in a centralized network management system, as taught by Solheim et al., in the modified WDM network of Golmie et al. and Acharya et al. because a centralized database provides network management personnel a whole picture of the network and facilitates network management.

11. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. and Acharya et al. as applied to claims 1-4 and 14 above, and further in view of Date ("An Introduction to Database Systems" by C. Date, Addison-Wesley, 1986, pp. 29-41).

Golmie et al. and Acharya et al. have been discussed above in regard to claims 1-4 and 14. The difference between Golmie et al. and Acharya et al. and the claimed invention is that Golmie et al. and Acharya et al. do not teach to store a separate network topology databases for each of said service levels. Date teaches in Chapter 2 architecture of a database system. In particular, Date teaches in FIG. 2.3 separate storage structure and separate external user views. One of ordinary skill in the art would have been motivated to combine the teaching of Date with the modified WDM network of Golmie et al. and Acharya et al. because separate database views provide network topology for each service level and allows management personnel to engineer and maintain each service level. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide separate topology databases, as taught by Date, in the modified WDM network of Golmie et al. and Acharya et al. because separate database views provide network topology for each service level and allows management personnel to engineer and maintain each service level.

12. Claims 18-20, 22, 24-25, 31-32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. (N. Golmie et al., "A Differentiated Optical Services Model for WDM Networks", IEEE Communications Magazine, February 2000) in view of Sengupta et al. (S. Sengupta et al, "Analysis of Enhanced OSPF for Routing Lightpaths in Optical Mesh Networks", IEEE 2002).

Golmie et al. teaches in FIG. 3 and Table 1 to divide a WDM network into separate service levels according to QoS criteria. Golmie et al. lists in Table 1 service level parameters and in FIG. 3 the wavelengths corresponding to a service level. The difference between Golmie et al. and the claimed invention is that Golmie et al. does not teach to form service level topology

structure. Sengupta et al. teaches in p. 2865, right col., last paragraph concept of optical line group and suggests to use opaque LSA to propagate optical LSA for supporting OSPF. This allows each access node to construct service level topology. One of ordinary skill in the art would have been motivated to combine the teaching of Sengupta et al. with the WDM network of Golmie et al. because extension of OSPF using optical LSA supports real time lightpath provisioning. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use extension of OSPF to construct service level topology, as taught by Sengupta et al., in the WDM network of Golmie et al. because extension of OSPF using optical LSA supports real time lightpath provisioning.

Regarding claim 19, Golmie et al. teaches in Table 1 BER.

Regarding claim 20, Sengupta et al. teaches in p. 2865, right col., last paragraph concept of optical line group

Regarding claim 22, OSPF (e.g., see RFC-2328) teaches to construct network topology structures representing connectivity of each access node.

Regarding claim 24, Sengupta et al. teaches to use OSPF which constructs link state database (e.g., see RFC-2328).

Regarding claim 25, Golmie et al. teaches in Table 1 BER.

Regarding claim 31, Sengupta et al. teaches to maintain link state database which contains up-to-date connectivity information for each node in the network.

Regarding claim 32, Golmie et al. teaches in Table 1 BER.

Regarding claim 34, Golmie et al. teaches in p. 71, right col., last paragraph to p. 72, left col., first paragraph to classify link according to its qualities.

13. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. and Sengupta et al. as applied to claims 18-20, 22, 24-25, 31-32 and 34 above, and further in view of Solheim et al. (U.S. Patent Application Pub. 2003/0016414 A1).

Golmie et al. and Sengupta et al. have been discussed above in regard to claims 18-20, 22, 24-25, 31-32 and 34. The difference between Golmie et al. and Sengupta et al. and the claimed invention is that Golmie et al. and Sengupta et al. do not teach a centralized network server. Solheim et al. teaches in FIG. 2A, FIG. 3 and paragraph [0072] centralized network and element management system (NEMS) and centralized database. One of ordinary skill in the art would have been motivated to combine the teaching of Solheim et al. with the modified WDM network of Golmie et al. and Sengupta et al. because a centralized database provides network management personnel a whole picture of the network and facilitates network management. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a centralized database in a centralized network management system, as taught by Solheim et al., in the modified WDM network of Golmie et al. and Sengupta et al. because a centralized database provides network management personnel a whole picture of the network and facilitates network management.

14. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. and Sengupta et al. as applied to claims 18-20, 22, 24-25, 31-32 and 34 above, and further in view of Jukan et al. (A. Jukan et al., "Constraint-based Path Selection Methods for On-demand Provisioning in WDM Networks", IEEE INFOCOM 2002).

Golmie et al. and Sengupta et al. have been discussed above in regard to claims 18-20, 22, 24-25, 31-32 and 34. The difference between Golmie et al. and Sengupta et al. and the

claimed invention is that Golmie et al. and Sengupta et al. do not teach to form intersection of the link service level channel sets and the links of a path. However, it is implicitly taught by OSPF, or it is taught by Jukan et al. Jukan et al. teaches in p. 832, left col., first paragraph to take intersection of service level channel and the path channel. A path exists only if the intersection of the link service level channel for all links is not null. One of ordinary skill in the art would have been motivated to combine the teaching of Jukan et al. with the modified WDM network of Golmie et al. and Sengupta et al. because when the intersection is null, connectivity using wavelength in the service level set is not possible. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to form intersection of the service level channels set and links of a path, as taught by Jukan et al., in the modified WDM network of Golmie et al. and Sengupta et al. because when the intersection is null, connectivity using wavelength in the service level set is not possible.

15. Claims 26-29, 33 and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. and Sengupta et al. as applied to claims 18-20, 22, 24-25, 31-32 and 34 above, and further in view of RFC-2328 (Moy, RFC-2328, "OSPF Version 2", IETF, April 1998).

Golmie et al. and Sengupta et al. have been discussed above in regard to claims 18-20, 22, 24-25, 31-32 and 34. The difference between Golmie et al. and Sengupta et al. and the claimed invention is that Golmie et al. and Sengupta et al. do not teach calculation of routing table and link management protocol. Sengupta et al. teaches extensions to OSPF, therefore RFC-2328, OSPF Version 2, is included for the teaching of link management protocol. One of ordinary skill in the art would have motivated to combine the teaching of RFC-2328 with the

modified WDM network of Golmie et al. and Sengupta et al. because it is suggested by Sengupta et al.

Regarding claims 26-29, RFC-2328 teaches in Section 16 calculation of routing table.

Regarding claim 33, RFC-2328 teaches in Section 10 neighbor states for keeping track of connectivity.

Regarding claims 35-36, RFC-2328 teaches in Section 16 calculating of routing table.

16. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al., and Sengupta et al. as applied to claims 18-20, 22, 24-25, 31-32 and 34 above, and further in view of Melaku et al. (U.S. Patent Application Pub. 2003/0074443 A1).

Golmie et al., and Sengupta et al. have been discussed above in regard to claims 18-20, 22, 24-25, 31-32 and 34. The difference between Golmie et al., and Sengupta et al. and the claimed invention is that Golmie et al., and Sengupta et al. do not teach to change service level. Melaku et al. teaches in FIG. 5 QoS broker for handling service level change request. Melaku et al. teaches in paragraph [0056] that if a user decides to change QoS requirements in the midst of a session, new resources are to be reallocated and a new path that meets the requested QoS is established. One of ordinary skill in the art would have been motivated to combine the teaching of Melaku et al. with the modified WDM network of Golmie et al., and Sengupta et al. because a QoS broker allows users to change service level depending on changes of their application needs. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a QoS broker for handling service level change requests, as taught by Melaku et al., in the modified WDM network of Golmie et al., and Sengupta et al. because a QoS broker allows users to change service level depending on changes of their application needs.

17. Claims 37-38 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et and Sengupta et al. as applied to claims 18-20, 22, 24-25, 31-32 and 34 above, and further in view of Freeman ("Telecommunication System Engineering" by R. Freeman, John Wiley & Sons, 1980, pp 99-103).

Golmie et al. and Sengupta et al. have been discussed above in regard to claims 18-20, 22, 24-25, 31-32 and 34. The difference between Golmie et al. and Sengupta et al. and the claimed invention is that Golmie et al. and Sengupta et al. do not teach a machine-readable medium. Freeman teaches in Section 12 stored-program control (SPC). Freeman teaches in p. 100 to store method steps as program in memory for providing instructions to a controller or computer. One of ordinary skill in the art would have been motivated to combine the teaching of Freeman with the modified WDM network of Golmie et al. and Sengupta et al. because SPC is flexible and expandable such that it is easy to upgrade the system by rewriting the program. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use SPC and store program in machine-readable medium, as taught by Freeman, in the modified WDM network of Golmie et al. and Sengupta et al. because SPC is flexible and expandable such that it is easy to upgrade the system by rewriting the program.

18. Claims 39 and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al., Sengupta et al. and Freeman as applied to claims 37-38 above, and further in view of RFC-2328 (Moy, RFC-2328, "OSPF Version 2", IETF, April 1998).

Golmie et al., Sengupta et al. and Freeman have been discussed above in regard to claims 37-38. The difference between Golmie et al., Sengupta et al. and Freeman and the claimed invention is that Golmie et al., Sengupta et al. and Freeman do not teach calculation of routing

table and link management protocol. Sengupta et al. teaches extensions to OSPF, therefore RFC-2328, *OSPF Version 2*, is included for the teaching of link management protocol. One of ordinary skill in the art would have motivated to combine the teaching of RFC-2328 with the modified WDM network of Golmie et al. and Sengupta et al. because it is suggested by Sengupta et al.

Regarding claim 39, RFC-2328 teaches in Section 10 neighbor states for keeping track of connectivity.

Regarding claims 41-42, RFC-2328 teaches in Section 16 calculating of routing table.

19. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al. (A. Jukan et al., "Constraint-based Path Selection Methods for On-demand Provisioning in WDM Networks", IEEE INFOCOM 2002) in view of Date ("An Introduction to Database Systems" by C. Date, Addison-Wesley, 1986, pp. 29-41).

Jukan et al. has been discussed above in regard to claims 43-46. The difference between Jukan et al. and the claimed invention is that Jukan et al. does not teach to store separate service level topology structure for each service level. Date teaches in Chapter 2 architecture of a database system. In particular, Date teaches in FIG. 2.3 separate storage structure and separate external user views. One of ordinary skill in the art would have been motivated to combine the teaching of Date with the DWP method of Jukan et al. because separate database views provide network topology for each service level and allows management personnel to engineer and maintain each service level. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide separate topology databases, as taught by Date, in

the DWP method of Jukan et al. because separate database views provide network topology for each service level and allows management personnel to engineer and maintain each service level.

20. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al. and Date as applied to claim 47 above, and further in view of Ashwood Smith (U.S. Patent 6,738,354 B1).

Jukan et al. and Date have been discussed above in regard to claim 47. The difference between Jukan et al. and Date and the claimed invention is that Jukan et al. and Date do not teach to include status of wavelengths as either allocated or unallocated in the database. Ashwood Smith teaches in FIG. 3 to use wavelength availability tables 28a, 28b and 30 during lightpath setup. One of ordinary skill in the art would have been motivated to combine the teaching of Ashwood Smith with the modified the DWP method of Jukan et al. and Date because a wavelength availability table keeps track of the availability of wavelengths and avoid assigning same wavelength to different lightpaths. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include wavelength availability tables for keeping track of whether a wavelength is allocated or available, as taught by Ashwood Smith, in the modified the DWP method of Jukan et al. and Date because a wavelength availability table keeps track of the availability of wavelengths and avoid assigning same wavelength to different lightpaths.

21. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al. (A. Jukan et al., "Constraint-based Path Selection Methods for On-demand Provisioning in WDM Networks", IEEE INFOCOM 2002) in view of Kodialam et al. (U.S. Patent Application Pub. 2002/0018264 A1).

Jukan et al. has been discussed above in regard to claims 43-46. The difference between Jukan et al. and the claimed invention is that Jukan et al. does not teach conversion free paths. Kodialam et al. teaches in paragraphs [0045] and [0046] that there are OXC with wavelength conversion capability and there are OXC without wavelength conversion capability. In network consisting of OXC without wavelength conversion, the conversion free constraint must be met. One of ordinary skill in the art would have been motivated to combine the teaching of Kodialam et al. with the DWP method of Jukan et al. because some OXC do not have wavelength conversion capability to keep the cost of OXC low and the paths are conversion free. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include conversion free constraint according to the capability of network elements, as taught by Kodialam et al., in the DWP method of Jukan et al. because some OXC do not have wavelength conversion capability to keep the cost of OXC low and the paths are conversion free.

22. Claims 50-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al. (A. Jukan et al., "Constraint-based Path Selection Methods for On-demand Provisioning in WDM Networks", IEEE INFOCOM 2002) in view of Freeman ("Telecommunication System Engineering" by R. Freeman, John Wiley & Sons, 1980, pp 99-103).

Jukan et al. has been discussed above in regard to claims 43-46. The difference between Jukan et al. and the claimed invention is that Jukan et al. does not teach a machine-readable medium. Freeman teaches in Section 12 stored-program control (SPC). Freeman teaches in p. 100 to store method steps as program in memory for providing instructions to a controller or computer. One of ordinary skill in the art would have been motivated to combine the teaching of Freeman with the DWP method of Jukan et al. because SPC is flexible and expandable such that

it is easy to upgrade the system by rewriting the program. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use SPC and store program in machine-readable medium, as taught by Freeman, in the DWP method of Jukan et al. because SPC is flexible and expandable such that it is easy to upgrade the system by rewriting the program.

23. Claims 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al. and Freeman as applied to claims 50-53 above, and further in view of Date ("An Introduction to Database Systems" by C. Date, Addison-Wesley, 1986, pp. 29-41).

Jukan et al. and Freeman have been discussed above in regard to claims 50-53. The difference between Jukan et al. and Freeman and the claimed invention is that Jukan et al. and Freeman do not teach to store separate service level topology structure for each service level. Date teaches in Chapter 2 architecture of a database system. In particular, Date teaches in FIG. 2.3 separate storage structure and separate external user views. One of ordinary skill in the art would have been motivated to combine the teaching of Date with the modified DWP method of Jukan et al. and Freeman because separate database views provide network topology for each service level and allows management personnel to engineer and maintain each service level. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide separate topology databases, as taught by Date, in the modified DWP method of Jukan et al. and Freeman because separate database views provide network topology for each service level and allows management personnel to engineer and maintain each service level.

Regarding claim 55, Jukan et al. teaches in p. 828, second and third paragraph to keep track of local network state information where each wavelength is marked as 'idle' or 'busy'.

24. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al. and Freeman as applied to claims 50-53 above, and further in view of Kodialam et al. (U.S. Patent Application Pub. 2002/0018264 A1).

Jukan et al. and Freeman have been discussed above in regard to claims 50-53. The difference between Jukan et al. and Freeman and the claimed invention is that Jukan et al. and Freeman do not teach conversion free paths. Kodialam et al. teaches in paragraphs [0045] and [0046] that there are OXC with wavelength conversion capability and there are OXC without wavelength conversion capability. In network consisting of OXC without wavelength conversion, the conversion free constraint must be met. One of ordinary skill in the art would have been motivated to combine the teaching of Kodialam et al. with the modified DWP method of Jukan et al. and Freeman because some OXC do not have wavelength conversion capability to keep the cost of OXC low and the paths are conversion free. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include conversion free constraint according to the capability of network elements, as taught by Kodialam et al., in the modified DWP method of Jukan et al. and Freeman because some OXC do not have wavelength conversion capability to keep the cost of OXC low and the paths are conversion free.

25. Claims 57-60 and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al. (A. Jukan et al., "Constraint-based Path Selection Methods for On-demand Provisioning in WDM Networks", IEEE INFOCOM 2002) in view of Melaku et al. (U.S. Patent Application Pub. 2003/0074443 A1).

Jukan et al. has been discussed above in regard to claim 43-46. The difference between Jukan et al. and the claimed invention is that Jukan et al. does not teach to change service level.

Melaku et al. teaches in FIG. 5 QoS broker for handling service level change request. Melaku et al. teaches in paragraph [0056] that if a user decides to change QoS requirements in the midst of a session, new resources are to be reallocated and a new path that meets the requested QoS is established. One of ordinary skill in the art would have been motivated to combine the teaching of Melaku et al. with the DWP method of Jukan et al. because a QoS broker allows users to change service level depending on changes of their application needs. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a QoS broker for handling service level change requests, as taught by Melaku et al., in the DWP method of Jukan et al. because a QoS broker allows users to change service level depending on changes of their application needs.

Regarding claims 58-59, Jukan et al. teaches WDM network.

Regarding claims 60, Jukan et al. teaches on-demand provisioning (see p. 831, right col., second paragraph), i.e., real time.

Regarding claim 63, it is obvious to one of ordinary skill in the art to move the traffic from the previous communication path with old service level to new communication path with changed QoS requirements and deallocate the communication path with old service level.

26. Claim 61 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al. and Melaku et al. as applied to claims 57-60 above, and further in view of Date ("An Introduction to Database Systems" by C. Date, Addison-Wesley, 1986, pp. 29-41).

Jukan et al. and Melaku et al. have been discussed above in regard to claims 57-60. The difference between Jukan et al. and Melaku et al. and the claimed invention is that Jukan et al. and Melaku et al. do not teach to store separate service level topology structure for each service

level. Date teaches in Chapter 2 architecture of a database system. In particular, Date teaches in FIG. 2.3 separate storage structure and separate external user views. One of ordinary skill in the art would have been motivated to combine the teaching of Date with the modified DWP method of Jukan et al. and Melaku et al. because separate database views provide network topology for each service level and allows management personnel to engineer and maintain each service level. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide separate topology databases, as taught by Date, in the modified DWP method of Jukan et al. and Melaku et al. because separate database views provide network topology for each service level and allows management personnel to engineer and maintain each service level.

27. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al. and Melaku et al. as applied to claims 57-60 above, and further in view of Kodialam et al. (U.S. Patent Application Pub. 2002/0018264 A1).

Jukan et al. and Melaku et al. have been discussed above in regard to claims 57-60. The difference between Jukan et al. and Melaku et al. and the claimed invention is that Jukan et al. and Melaku et al. do not teach conversion free paths. Kodialam et al. teaches in paragraphs [0045] and [0046] that there are OXC with wavelength conversion capability and there are OXC without wavelength conversion capability. In network consisting of OXC without wavelength conversion, the conversion free constraint must be met. One of ordinary skill in the art would have been motivated to combine the teaching of Kodialam et al. with the modified DWP method of Jukan et al. and Melaku et al. because some OXC do not have wavelength conversion capability to keep the cost of OXC low and the paths are conversion free. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include

conversion free constraint according to the capability of network elements, as taught by Kodialam et al., in the modified DWP method of Jukan et al. and Melaku et al. because some OXC do not have wavelength conversion capability to keep the cost of OXC low and the paths are conversion free.

28. Claims 64-67 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al. and Melaku et al. as applied to claims 57-60 above, and further in view of Freeman ("Telecommunication System Engineering" by R. Freeman, John Wiley & Sons, 1980, pp 99-103).

Jukan et al. and Melaku et al. have been discussed above in regard to claims 57-60. The difference between Jukan et al. and Melaku et al. and the claimed invention is that Jukan et al. and Melaku et al. do not teach a machine-readable medium. Freeman teaches in Section 12 stored-program control (SPC). Freeman teaches in p. 100 to store method steps as program in memory for providing instructions to a controller or computer. One of ordinary skill in the art would have been motivated to combine the teaching of Freeman with the modified DWP method of Jukan et al. and Melaku et al. because SPC is flexible and expandable such that it is easy to upgrade the system by rewriting the program. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use SPC and store program in machine-readable medium, as taught by Freeman, in the modified DWP method of Jukan et al. and Melaku et al. because SPC is flexible and expandable such that it is easy to upgrade the system by rewriting the program.

29. Claim 68 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al., Melaku et al. and Freeman as applied to claims 64-67 and 70 above, and further in view of Date ("An Introduction to Database Systems" by C. Date, Addison-Wesley, 1986, pp. 29-41).

Jukan et al., Melaku et al. and Freeman have been discussed above in regard to claims 57-60. The difference between Jukan et al., Melaku et al. and Freeman and the claimed invention is that Jukan et al., Melaku et al. and Freeman do not teach to store separate service level topology structure for each service level. Date teaches in Chapter 2 architecture of a database system. In particular, Date teaches in FIG. 2.3 separate storage structure and separate external user views. One of ordinary skill in the art would have been motivated to combine the teaching of Date with the modified DWP method of Jukan et al., Melaku et al. and Freeman because separate database views provide network topology for each service level and allows management personnel to engineer and maintain each service level. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide separate topology databases, as taught by Date, in the modified DWP method of Jukan et al., Melaku et al. and Freeman because separate database views provide network topology for each service level and allows management personnel to engineer and maintain each service level.

30. Claim 69 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jukan et al., Melaku et al. and Freeman as applied to claims 64-67 and 70 above, and further in view of Kodialam et al. (U.S. Patent Application Pub. 2002/0018264 A1).

Jukan et al., Melaku et al. and Freeman have been discussed above in regard to claims 57-60. The difference between Jukan et al., Melaku et al. and Freeman and the claimed invention is that Jukan et al., Melaku et al. and Freeman do not teach conversion free paths.

Kodialam et al. teaches in paragraphs [0045] and [0046] that there are OXC with wavelength conversion capability and there are OXC without wavelength conversion capability. In network consisting of OXC without wavelength conversion, the conversion free constraint must be met. One of ordinary skill in the art would have been motivated to combine the teaching of Kodialam et al. with the modified DWP method of Jukan et al., Melaku et al. and Freeman because some OXC do not have wavelength conversion capability to keep the cost of OXC low and the paths are conversion free. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include conversion free constraint according to the capability of network elements, as taught by Kodialam et al., in the modified DWP method of Jukan et al., Melaku et al. and Freeman because some OXC do not have wavelength conversion capability to keep the cost of OXC low and the paths are conversion free.

31. Claims 71-73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al. (N. Golmie et al., "A Differentiated Optical Services Model for WDM Networks", IEEE Communications Magazine, February 2000) in view of Sengupta et al. (S. Sengupta et al, "Analysis of Enhanced OSPF for Routing Lightpaths in Optical Mesh Networks", IEEE 2002), RFC-2328 (Moy, RFC-2328, "OSPF Version 2", IETF, April 1998) and Date ("An Introduction to Database Systems" by C. Date, Addison-Wesley, 1986, pp. 5-9).

Golmie et al. teaches in FIG. 3 and Table 1 to divide a WDM network into separate service levels according to QoS criteria. Golmie et al. lists in Table 1 service level parameters and in FIG. 3 the wavelengths corresponding to a service level. The difference between Golmie et al. and the claimed invention is that Golmie et al. does not teach calculation of end-to-end path. Sengupta et al. teaches in p. 2865, right col., last paragraph concept of optical line group

and suggests to use opaque LSA to propagate optical LSA for supporting OSPF (RFC-2328). This allows each access node to construct service level topology and calculate end-to-end paths. One of ordinary skill in the art would have been motivated to combine the teaching of Sengupta et al. and RFC-2328 with the WDM network of Golmie et al. because extension of OSPF using optical LSA supports real time lightpath provisioning. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use extensions of OSPF for calculating end-to-end lightpaths, as taught by Sengupta et al. and RFC-2328, in the WDM network of Golmie et al. because extension of OSPF using optical LSA supports real time lightpath provisioning.

The combination of Golmie et al., Sengupta et al. and RFC-2328 still fails to teach a machine-readable medium. However, it is well known in the art that database is commonly stored in machine-readable medium so that information can be processed quickly. For example, Date teaches in FIG. 1.4 a simplified picture of a database system and in p. 7 hardware for a database system. Date teaches in p. 7 last paragraph that hardware for database system consists of secondary storage volumes, typically moving-head disks. One of ordinary skill in the art would have been motivated to combine the teaching of Date with the modified database of Golmie et al., Sengupta et al. and RFC-2328 because a disk can store large amount of data and provides fast access to computers for processing information of the database. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to store database in machine-readable medium such as disks, as taught by Date, in the modified database of Golmie et al., Sengupta et al. and RFC-2328 because disks can store large amount of data and provide fast access to computers for processing information of the database.

Regarding claim 72, RF-2328 teaches in Section 2 link-state database.

Regarding claim 73, Date teaches in Chapter 2 architecture of a database system. In particular, Date teaches in FIG. 2.3 separate storage structure and separate external user views.

32. Claims 74-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Golmie et al., Sengupta et al., RFC-2328 and Date as applied to claims 71-73 above, and further in view of Deo ("Graph Theory with Applications to Engineering and Computer Science" by N. Deo, Prentice-Hall, 1974).

Golmie et al., Sengupta et al., RFC-2328 and Date have been discussed above in regard to claims 71-73. The difference between Golmie et al., Sengupta et al., RFC-2328 and Date and the claimed invention is that Golmie et al., Sengupta et al., RFC-2328 and Date do not teach to use a table or a tree to represent service level topology. Networks are mathematically represented as graphs. Deo teaches in chapter 7 to represent graphs as matrix (or table). One of ordinary skill in the art would have been motivated to combine the teaching of Deo with the modified machine-readable medium of Golmie et al., Sengupta et al., RFC-2328 and Date to represent network as matrix because matrices are better for computer processing. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to represent service level topology structures as table, as taught by Deo, in the modified machine-readable medium of Golmie et al., Sengupta et al., RFC-2328 and Date.

Regarding claim 75, OSPF teaches in Section 2.2 shortest-path tree.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (8:30 a.m. - 5:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

7 January 2005

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PRIMARY EXAMINER